Two-photon cascade in InAs quantum dots

Pairs of correlated single photons have been obtained from the emission cascade of an isolated InAs quantum dot. The cross correlation function of the two photons in a pair exhibits the co-existence of asymmetric bunching and antibunching features, which is the signature for their sequential emission with a definite order. This allows the use of semiconductor quantum dots as triggered sources of photon pairs with strong quantum correlations for quantum information applications. Collaboration and further research or development support is being sought

Contact: Dr Izo Abrah, Centre National de la Recherche Scientifique, France. Email: izo.abram@lpn.cnrs.fr

Solid state photon source on diamond

A stable solid-state room temperature source for single photons is reported, based on the fluorescence of a single nitrogen-vacancy (NV) colour canter in a diamond nanocrystal. Antibunching has been observed in the fluorescence light under pulsed excitation. The source delivers 105 s-1 single-photon pulses at an excitation repetition rate of 5MHz. The number of two-photon pulses is reduced by a factor of 14 compared to the strongly attenuated coherent sources. Collaboration or further R&D support, joint ventures or information exchange wanted.

Contact: Philippe Granger, Head of Quantum Optics Group, Organisation: Institut d'Optique, Centre Universitaire, France. Email: phillippe.grangier@iota.u-psud.fr

Strained silicon polymer transistors aired to compound's single hand applause.

Gene Fitzgerald of MIT (and Amberwave Inc) discussed the history of strained silicon. He explained that there are only four big IC products that are surfing the advances of Moore's Law: FPGA, DSP, microprocessors, and memory. Making existing sized designs with faster transistors will have more impact than stuffing more transistors on the same chip size. Another problem is in layout of large ICs with the interconnections between transistors. Fitzgerald looks at future microsystems as wanting to combine three vastly different functions: the digital, fast analog, and the interface with E&M waves. The last two functions are the bottle neck for microsystems, since they are made of compound semiconductors which have not been obeying the same manufacturing history curves as silicon. He finds that by adding enough layers and enough Ge to some of these layers that all functions can be made on the same chip using existing manufacturing equipment. One such layering system has strained silicon on top, next a Si (80%) Ge(20%), graded SiGe layer to reduce lattice mismatch and a bottom Si substrate. Using variations of these strained layers gives electron mobility of 80% with another Ge rich layer which eventually increases hole mobility by 800%. The low temperature formation of some of these layers is currently being addressed. If one of the layers has Ge >70%, one could add opto sources to the chip. One could also lower voltages even further with increased Ge. In summary, he considered that there is room for 1000% performance improvements by making 'designer' strained wafers for existing foundries.

Dr. Henning Sirringhaus of Plastic Logic Ltd presented the era of polymer transistors. Most of the audience was brought up fighting with inorganic crystalline semiconductors so this presentation made the first one seem almost possible. Sirringhaus basic premise was printing is a cheap, efficient, well known technology. If polymer materials can be refined so transistors of reasonable characteristics can be 'printed' at the same dpi as the '*National Geographic*', many applications will be performed by polymers rather than silicon. Work to date has been on 'pMOS' with special surface adhesive pattern treatments to allow short channels to be easily printed. Best mobility has been achieved by vacuum deposition of pentacene. Mobility is 5cm^2/v.s. If this seems low, he pointed out that in the last decade mobility in polymers has improved 4 orders of magnitude with no obvious future brick wall.

Everyone expected another presentation on the leading edge of compound semiconductors. But while several speakers had been lined up, their companies declined support. Since compound semiconductors have been the future for most of the audience engineers' careers, this may mean the beginning of the end of the compound industry (apart from niches like traffic lights). Yet again the silicon juggernaut grinds down the competition.

Source:http://www.ewh.ieee.org/soc/cpmt/newsletter/200306/planery.html

Electromagnetic screening

A Bulgarian company has invented a new multi-layer metal coating deposited by chemical and electrochemical methods onto the surface acrylonitrile butadiene styrene - copolymer parts of the electronic device (e.g. telephone set). The individual layers can be either from a single metal (e.g. copper, nickel, iron), or alloys and composite materials as a polymer matrix containing highly dispersed fine-grained metal powder. The electromagnetic screening of electronic devices against unauthorised access is in conformity with US military standard-MIL-STD-461E/1999, applicable mainly in the telecoms and military industries. It is also used to protect equipment against extrinsic electromagnetic interference. The company is interested in licensing, joint venture and manufacturing agreement.

Contact Vladislav Jivkov. Email: vladislav.jivkov@online.bg

BASF invests

BASF is investing in Micro Emissive Displays Ltd of Edinburgh as is lead investor Scottish Equity Partners and 3i, raising a total of $7.5m. MED has developed microdisplay technology based on light-emitting polymers now ready for market. Compared with liquid crystal displays, the new materials are characterised by significantly lower power consumption and production costs. The market expects to reach $2.2bn by 2006.